# Investigating the Effect of Organizational Culture Factors on Success of Business Intelligence Factors

Niousha Zeidyahyaee [1]
Sajjad Shokouhyar [2*]

1. Department of Management of Information Technology, School of Management and Accounting, Shahid Beheshti University, Tehran, Iran.
Niousha.z.yahyaee@gmail.com
2. Department of Management of Information Technology, School of Management and Accounting, Shahid Beheshti University, Tehran, Iran.
*Corresponding Author E-mail: Shokohyar@gmail.com

**ABSTRACT:** In the realm of information technology the human effects on success or failure of systems has always been a topic of debate for researchers. In this regard organizational culture has attracted a growing internet among researchers in recent years. The aim of this study is to investigate the effect of organizational culture on success of business intelligence system in Arayasasol company. For this purpose, a conceptual model has been developed from the literature. Data gathering were done questionnaire and 287 filled questionnaires were collected from employees who are in direct contact with business intelligence system. Results showed all the developed hypotheses were supported. Managerial implications with directions for future research were presented at the final section of this research.

**Keywords**: business intelligence, organizational culture, system acceptance, organizational learning.

## INTRODUCTION

In recent years organizations first priority is to survive in the fierce competition of market. Therefore, need for being more creative, more innovative and more adaptable to the market condition is now more than ever. For fulfilling this need different companies apply different tools. One of the recently introduced tools is business intelligence (Youngberg et al., 2009). Business intelligence is an emerging tool and since its introduction in recent years has been one of the fastest growing fields in the business world (Ngae et al., 2008). The concept is now considered very effective regarding development of competitive edge. The usefulness of Business Intelligence is to gather the required knowledge to create opportunity in the market. In fact, knowledge is increasingly playing a fundamental role as a survival element in organization, at the same time it greatly relies on people and the influence of their collective characteristics in the form of organizational culture (Olszak 2007).

In several researches there are different variables and features influential on business practices (Rosen 2005). However, only few researches developed framework on this subject. One of these influential factors which have been indicated in few researches in literature is organizational culture which can be either impediment or catalyzer to successful business intelligence implementation. Because of its key role in

organizations financial and marketing prosperous, in recent years there has been a great deal of attention to organizational culture (Raz and Hilsson, 2005).

Theoretically, prior researches have supported the idea of direct effect of organizational culture on organizational performance. Moreover, organizational culture is considered as one of the key effective variables on organization performance. It is clear from the literature that organizational culture is considered as a prerequisite for successfully utilizing business intelligence in the company (Sternad, 2005; Scot, 2005; Tsuie et al., 2006). Despite the clear link between business intelligence and effect of organizational culture, few studies have investigated this relationship.

This research is aimed to investigate the role of organizational culture in the success of business intelligence process. It has come to fill the gap in literature since previous research in this regard were more focused on other features such as organizational size, sector and demographic features. And even few studies on organizational culture were considering the concept as a one dimension without aspects but the aim of this study is to consider the effect of different dimensions of organizational culture on success of business intelligence. The oil industry as one of the most advanced industries in Iran in which business intelligence and different information technology solutions are popular is chose for fulfilling the above-mentioned purposes. The rest of the article goes as below. At the following section literature review and prior researches regarding business intelligence and organizational culture will be presented. After evaluation of prior research methodology of the research will be presented which is follows by data analysis section. Finally, we will conclude our results at the final section with directions for future research and limitations of our research.

## LITERATURE REVIEW

### Organizational Culture

Organizational culture has been considered as a multi-dimension construct which van be divided into dimensions according to the aim of each research. There have been different definitions of culture in literature of management. Starting from 1985 with research of Kroeber with over 160 different definitions, Kanungo (2006) discussed that majority of definitions of culture respect the idea that culture is based on values, attitudes, religion, status economy and education. Moreover, Berg (2008) discussed that culture embrace shared mental programmers that individuals use to response to environment transactions. Other researchers like Early et al., (2006) described culture as the patterned ways of thinking, feeling and reacting to different situations and actions which is done by use of different symbols. Based on what we learned as definition of culture from literature, we should define organizational culture.

Organizational culture has been defined as patterns of shared values and beliefs which will be result in norms for solving problems (Daryaie et al, 2013). In organization the definition of culture is limited to involved people who are employees and managers, therefore, is manifested in beliefs and assumptions, values, attitudes and behaviors of these employees and managers (Dezdar, 2011). In the literature there are several researches role of organizational culture on different organizational tools for boosting the performance of organization. This is mainly due to power of organizational culture on shaping organizational procedures, unifies organizational capabilities into cohesive whole, providing solutions to organizational solutions and finally facilitating the organization's achievement of its goals (Yilmaz, 2008).

## Business Intelligence

Business intelligence enhances organizations abilities regarding externally and internally understanding of environment with use of different kind of analysis and interpretation of data. Business intelligence systems are mainly categorized in 2 segments which the first class is based on database management for analyzing huge operational databases and second class uses information for building competitive edge through competitive intelligence tools. Companies with lack of actionable insights need information systems that enhance them to get a better perception on environmental forces and improve their performance by producing useful information (Zhang et al., 2008). Organizations either private or public (including governmental) show interest in implementing business intelligence. In recent years, the business intelligence market has experienced significant growth and business intelligence solutions have topped the list of priorities of many chief information officers. Business intelligence is a broad term that includes the collection of data from source systems, storing and accessing data and analyzing it using business intelligence technologies and applications (Hong et al, 2011).

The acceptance and use of information systems in the workplace is a priority of information systems research and practice (Lee et al, 2009). Numerous researches have been done in literature to uncover user acceptance of business intelligence. Consequently, many different models and theories which integrate a variety of behavioral, social and other control factors have been developed to explain business intelligence usage. Those researches main objective was to predict business intelligence acceptance and facilitate design changes before users have experience with a system. Acceptance is basically conceptualized as the result of a psychological process users undergo when making decisions about new technology. An ongoing research question in the field of business intelligence is the identification of the determinants that influence the acceptance and use of business intelligence. Many theories and models addressing this problem have been developed in recent years. Below we will discuss about recent key research and models in relevant literature.

In the research of Lu et al., (2009) key influential factors for implementing a successful business intelligence system were investigated. This study done by a qualitative approach was implemented in 15 companies by Delphi interviewing with experts. A model was developed by results which show that there are three different kinds of success factors namely, organizational, procedural and technological. In organizational dimension there are factors relating to vision and business and factors relating to management. In procedural dimension there are factors relating to methods and approaches, factors relating to change management and factors relating to team. Finally, in technology dimension there are factors relating to data and factors relating to infrastructure (Lue et al., 2009).

There are other researches which did not directly assess the cultural factors on success of business intelligence and were mainly emphasized on effect of environmental factor on business intelligence. In the research of Leen et al., (2004) environment of business intelligence were considered as a multidimensional concept with human capital, knowledge process, infrastructure and culture. They used TAM model for usage of business intelligence and results showed that all the dimensions of environment will lead to usage of business intelligence with mediating role of ease of use. Meek (2005) investigated the effect of organizational factors on ERP success implementation; the universe of this research was Iranian companies. Results showed that those companies

which had support of top management for implementation of ERP have the highest rate of success. Moreover, satisfaction of employees from the system was the other major factor which had influence on successful implementation of ERP.

## CONCETUAL MODEL AND HYPOTHESES

Based on review of the literature conceptual model and hypotheses are as below:

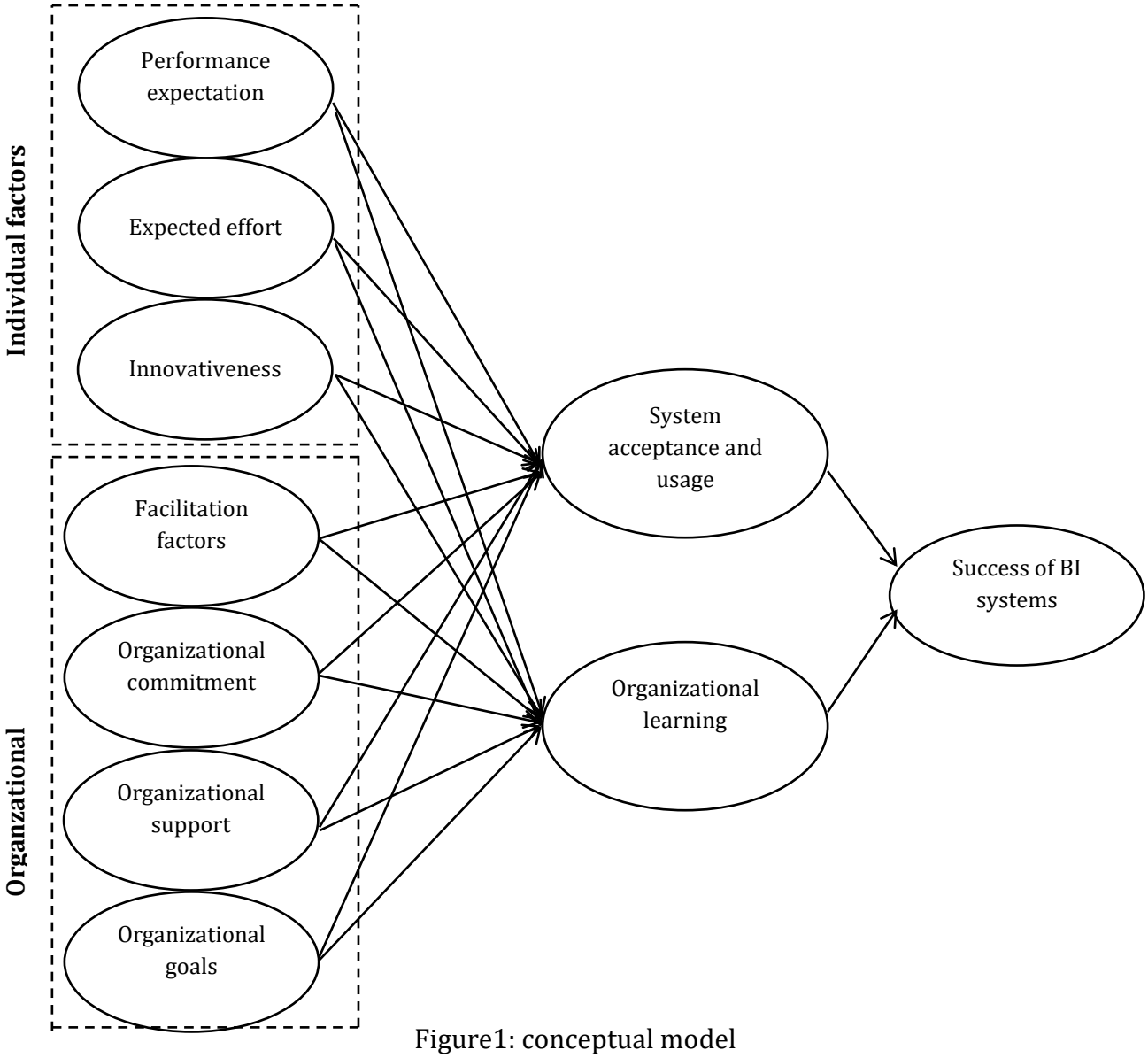


Figure1: conceptual model

$H_1$: Performance expectation has direct positive effect on system acceptance and usage.
$H_2$: Expected effort has direct positive effect on system acceptance and usage.
$H_3$: Innovativeness has direct positive effect on system acceptance and usage.
$H_4$: facilitating factors has direct positive effect on system acceptance and usage.
$H_5$: Organizational commitment has direct positive effect on system acceptance and usage.
$H_6$: Organizational support has direct positive effect on system acceptance and usage.
$H_7$: organizational goals have direct positive effect on system acceptance and usage.
$H_8$: Performance expectation has direct positive effect on organizational learning.

$H_9$: Expected effort has direct positive effect on organizational learning.
$H_{10}$: Innovativeness has direct positive effect on organizational learning.
$H_{11}$: facilitating factors has direct positive effect on organizational learning.
$H_{12}$: Organizational commitment has direct positive effect on organizational learning.
$H_{13}$: Organizational support has direct positive effect on organizational learning.
$H_{14}$: organizational goals have direct positive effect on organizational learning.
$H_{15}$: organizational learning has direct positive effect on system acceptance and usage.
$H_{16}$: organizational learning has direct positive effect on success of BI system.
$H_{17}$: organizational acceptance and usage has direct positive effect on success of BI system.

## METHODOLOGY

This research consists of descriptive research designed to determine if different dimensions of organizational culture has effect on success of business intelligence implementation. Pilot testing of the study was carried out by collecting primary data with help of questionnaire distributed to 30 employees in Aryasasol Company at Iran.

### Measures

For the purpose of measuring organizational culture Dension (2000) has been adapted. For the variable of successful implementation of business intelligence Polin (2014) scale items was used and for both variables of organizational learning and ease of use measurement of Dension (2000) was adapted. All of the items were measured based on Likert scale with anchors strongly disagree (=1) to strongly agree (=5). The first part of the questionnaire was designed for demographic information and the second part was for main questions of the research. All of the questions were closed ended and there were no open-ended used questions in this research.

### Sample

The data for this research were gathered using a self-administrated questionnaire. The universe was all the employees and managers of Aryasasol company which were using business intelligence system. With using non-probable convenient sampling and according to Morgan table since the universe were 1297 employees in the company the sample was 287 employees. The general information of the sample is presented in the table 1.

**Table1: demographic information of the sample**

| Percentage | Levels | Variable | Percentage | Levels | Variable | Percentage | Levels | Variable |
|---|---|---|---|---|---|---|---|---|
| 72 | married | Marital Status | 35 | Under 30 | Age | 81 | Men | Gender |
| 28 | single | | 34 | 30-40 | | 19 | Women | |
| | | | 19 | 40-50 | | 23 | Diploma | Education |
| | | | 12 | More than 50 | | 42 | Bachelor | |
| | | | | | | 35 | Master or Higher | |

As the table 1 show nearly 80% of employees and managers who are using business intelligence system are men and 20% are women. From this sample 72% are married and 28% are single. Regarding the education nearly half of the sample is consists of employees with bachelor degree. Finally, nearly 70% of employees in our sample are under 40 years of age.

## ANALYSIS

### Hypotheses testing

In order to perform statistical analysis LISREL 8.5 and SPSS 21 were used as statistical software. Before testing the hypotheses, correlation of variables should be figured out this is presented in table 2. According to the table highest correlation is between performance expectation and facilitating factors with 0.75 correlations and the least amount is for correlation between organizational support and organizational goals. Results of the table showed us there is correlation between dependent and independent variables of our research which is a prerequisite of performing regression analysis for the next section.

**Table2: Correlation analysis**

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Performance expectation | _ | 0.41* | 0.32* | 0.75* | 0.54* | 0.43* | 0.30* | 0.33* | 0.25* | 0.30* |
| Expected effort | _ | _ | 0.28* | 0.35* | 0.41* | 0.27* | 0.24* | 0.31* | 0.45* | 0.35* |
| Innovativeness | _ | _ | _ | 0.23* | 0.34* | 0.14** | 0.41* | 0.75* | 0.70* | 0.27* |
| Facilitating factors | _ | _ | _ | _ | 0.71* | 0.26* | 0.30* | 0.23* | 0.45* | 0.12** |
| Organizational commitment | _ | _ | _ | _ | _ | 0.49* | 0.37* | 0.69* | 0.53* | 0.31* |
| Organizational support | _ | _ | _ | _ | _ | _ | 0.11** | 0.66* | 0.42* | 0.23* |
| Organizational goals | _ | _ | _ | _ | _ | _ | _ | 0.23* | 0.37* | 0.41* |
| System acceptance and usage | _ | _ | _ | _ | _ | _ | _ | _ | 0.36* | 0.26* |
| Organizational learning | _ | _ | _ | _ | _ | _ | _ | _ | _ | 0.34* |
| Success of BI system | _ | _ | _ | _ | _ | _ | _ | _ | _ | _ |

***= p<0.01 , **= p<0.05**

As shown in table 3, a confirmatory factor analysis was first performed for testing the variables. Moreover, the reliability of scales was measured through the composite reliability and the Cronbach's Alpha for all the constructs. In particular, all the estimated indices were above the threshold of 0.7 for Cronbach's alpha (Nunnally and Bernstein, 1998) and 0.6 for CR (Bagozzi and Yi, 1988). This showed good internal consistency of scales. In addition, we obtained acceptable values for the extracted variances, being all the standardized factor loadings statistically significant for all the items. Moreover, as all AVE values were greater than 0.5, we concluded that more than 50% of variances of a

construct was due to its indicators (Fornell and Larcker, 1981). All this allowed us to confirm the convergent validity of the model.

**Table 3: Constructs and Items measurement**

| Construct | Cronbach's alpha | Composite reliability | Average variance extracted |
|---|---|---|---|
| Performance expectation | 0.75 | 0.84 | 0.64 |
| Expected effort | 0.83 | 0.91 | 0.57 |
| Innovativeness | 0.79 | 0.75 | 0.51 |
| Facilitating factors | 0.81 | 0.82 | 0.69 |
| Organizational commitment | 0.89 | 0.93 | 0.66 |
| Organizational support | 0.72 | 0.88 | 0.53 |
| Organizational goals | 0.78 | 0.81 | 0.67 |
| System acceptance and usage | 081 | 0.92 | 0.55 |
| Organizational learning | 0.77 | 0.72 | 0.58 |
| Success of BI system | 0.84 | 0.80 | 0.68 |

An examination of t values and significance level reveals that all the hypotheses are significant. Figure2 reports β of the paths, t values and whether the hypotheses are supported or not. Results shows that performance expectation has direct and significant impact on both system acceptance and usage (β=0.57, t= 13.6) and organizational learning (β=0.33, t= 7.47) thus H1 and H8 are supported. Expected effort has direct positive effect on system acceptance and usage (β=0.31, t= 6.93) and organizational learning (β=0.29, t= 6.17), thus H2 and H9 are supported. Innovativeness has direct and significant impact on both system acceptance and usage (β=0.76, t= 16.73) and organizational learning (β=0.61, t= 14.75) thus H3 and H10 are supported. Facilitators has direct and significant impact on both system acceptance and usage (β=0.23, t= 4.97) and organizational learning (β=0.15, t= 2.08) thus H4 and H11 are supported. Organizational commitment has direct and significant impact on both system acceptance and usage (β=0.63, t= 14.92) and organizational learning (β=0.59, t= 14.34) thus H5 and H12 are supported. Organizational support has direct and significant impact on both system acceptance and usage (β=0.28, t= 5.85) and organizational learning (β=0.19, t= 2.63) thus H6 and H13 are supported. Organizational support has direct and significant impact on both system acceptance and usage (β=0.48, t= 11.26) and organizational learning (β=0.51, t= 11.83) thus H7 and H14 are supported. Organizational learning has direct positive effect on system acceptance and usage (β=0.52, t= 12.07), thus H15 is supported. Organizational learning has direct positive effect on success of business intelligence system (β=0.37, t= 9.51), thus H16 is supported. Finally, system acceptance and usage has direct positive effect on success of business intelligence system (β=0.60, t= 14.68), thus H17 is supported.

**Table 3: Hypotheses results**

| Hypotheses number | Hypotheses | | t-value | β | Hypothesis status |
|---|---|---|---|---|---|
| 1 | Pefromance expectation | → System acceptane and usage | 13.6 | 0.57 | supported |
| 2 | Expected effort | → System acceptane and usage | 6.93 | 0.31 | supported |
| 3 | Innovativeness | → System acceptane and usage | 16.73 | 0.76 | supported |
| 4 | Facilitators | → System acceptane and usage | 4.97 | 0.23 | supported |
| 5 | Organizartional commitement | → System acceptane and usage | 14.92 | 0.63 | supported |
| 6 | Organizational support | → System acceptane and usage | 5.85 | 0.28 | supported |
| 7 | Organizational Goals | → System acceptane and usage | 11.26 | 0.48 | supported |
| 8 | Perfroamcne expectation | → Organizational Learning | 7.47 | 0.33 | supported |
| 9 | Expected Effort | → Organizational Learning | 6.17 | 0.29 | supported |
| 10 | Innovativeness | → Organizational Learning | 14.75 | 0.61 | supported |
| 11 | Facilitators | → Organizational Learning | 2.08 | 0.15 | supported |
| 12 | Organizational commitment | → Organizational Learning | 14.34 | 0.59 | supported |
| 13 | Organizational support | → Organizational Learning | 2.63 | 0.19 | supported |
| 14 | Organizational Goals | → Organizational Learning | 11.83 | 0.51 | supported |
| 15 | Organizational Learning | → System acceptane and usage | 12.07 | 0.52 | supported |
| 16 | Organizational Learning | → Success of Business Intelligence System | 9.51 | 0.37 | supported |
| 17 | System Acceptance and Usage | → Success of Business Intelligence System | 14.68 | 0.6 | supported |

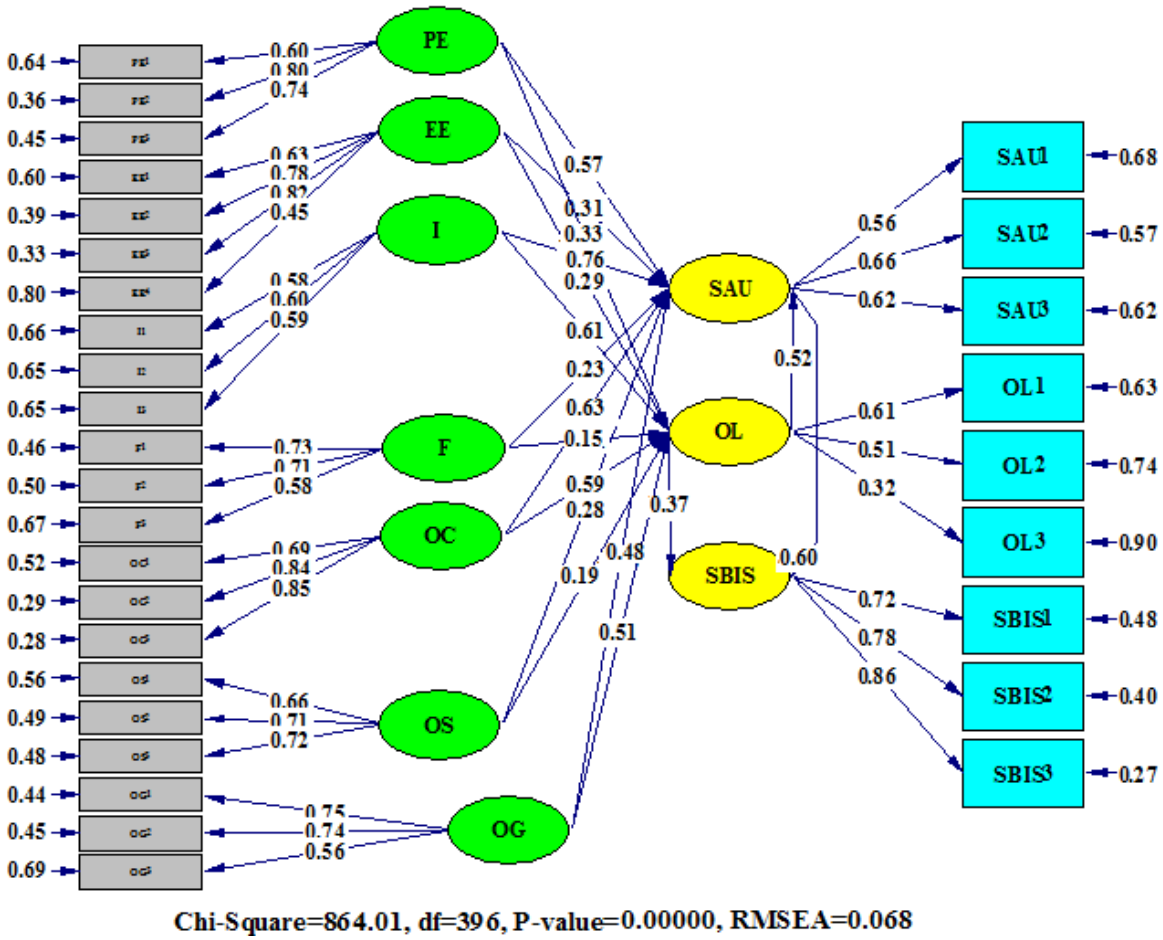


**Figure 2: results of hypotheses testing**

## CONCLUSION

The aim of this research was to investigate the effect of organizational culture on success of business intelligence system in the Aryasasol company in Iran. For this reason, a conceptual model has been developed based on related literature in this field. For testing the model, questionnaire was distributed among managers and employees in direct contact with business intelligence system. Results supported the developed hypothesis of the research.

Results showed that three factors related to individual organizational culture dimension which are innovativeness, expected effort and expectation from performance where all have effect on both system acceptance and usage and organizational learning. This means more employee innovativeness will lead to more BI system acceptance and consequently increases the chance of system success. Therefore, human resource manager could include innovativeness as a prerequisite of recruitment of staff in direct daily contact with BI system. Moreover, special innovativeness training plans could be held for BI employees. Regarding expected effort and expectation from performance which are mostly motivational factors managers should make sure employees are rewarded based on their effort and expectation. This will gradually lead employees with more mental job security.

Facilitators, organizational commitment, organizational support and organizational goal were the 4 factors of organizational culture. Results showed that all

4 factors have effect on organizational learning and consequently on success of BI system in the company. Therefore, equipping the company with more facilitating equipment could increase the chance of success of BI system. Moreover, organizational commitment and organizational support could be increased by top managers and motivational plans for employees.

This research main concentration was on organizational culture and its effect on success of BI system, future studies can use mediating factors like organizational citizenship behavior or employees' satisfaction or loyalty which could be effective on success of BI factors. Moreover, this research was done in one industry and in one company, future studies can study different companies on different industries to see if there is any probable difference between results.

**REFERENCES**

[1].Al-Mashari, M., Al-Mudimigh, A. and Zairi, M. (2003), "Enterprise resource planning: a taxonomy of critical factors", European Journal of Operational Research, Vol. 146, pp. 352-64.

[2].Kanongo, G, K., (2006). An extension of the technology acceptance model in an ERP implementation environment. Information & Management, 41(6), 731–745.

[3].Early, I.C. Hwang, H.G. Hung, W.F. and Li, Y.C. (2006). Physicians' acceptance of pharmacokinetics-based clinical decision support systems. Expert Systems with Applications, Vol.33, No.2, p.p. 296-303.

[4].Daryaei, M. Shirzad, M. and Kumar, V. (2013). Adoption of business intelligence in hotel industry.

[5].Dezdar, Sh. And Ainin, S (2011). The influence of organizational factors on successful ERP implementation. Management Decision, Vol,49, No.6, pp.911-926.

[6].Berg, M. (2008). Physician's behavior intentions. The use of mobile technology: an exploratory study in: The 8th Pacific- Asia Conference on Information Systems, 2004, 8-11 July, Shanghai, China.

[7].Hong, J. C., Hwang, M. Y., Hsu, H. F., Wong, W. T., & Chen, M. Y. (2011). Applying the technology acceptance model in a study of the factors affecting usage of the Taiwan digital archives system. Computers & Education. 57(3).2086-2094.

[8].Lee, C.K.M. Lau, H.C.W. Ho, G.T.S. and Ho, W. (2009). Design and development of agent- based procurement system to enhance business intelligence. Expert System with Applications, vol.36, No.1, p.p.877-884.

[9].Lu, Y., Zhou, T., & Wang, B. (2009). Exploring Chinese users' acceptance of instant messaging using the theory of planned behavior, the technology acceptance model, and the flow theory. Computers in Human Behavior, 25(1), 29–39.

[10]. Lin, J. Chan, H. and Jin, Y. (2004). Instant messaging acceptance and use among college students. The 7th Pacific Asia Conference on Information Systems, Cairns, Australia, p.p. 181-194.

[11]. Meek, GE. (2005). Center for navy business exellence a catalyst for business transformation.

[12]. Ngai, E.W.T., Law, C.C.H. and Wat, F.K.T. (2008), "Examining the critical success factors in the adoption of enterprise resource planning", Computers in Industry, Vol. 59 No. 6, pp. 548-64.

[13]. Olszak, C.M. and Ziemba, E. (2007). Approach to building and implementing business intelligence systems. Interdisciplinary Journal of Information, Knowledge and Management, Vol.2.

[14]. Rosen, P. (2005). The effect of personal innovativeness on technology acceptance and use. PHD Thesis, Oklahoma State University.

[15]. Raz, T, and Hillson, D. (2005). A comparative review of risk management standards. Risk Management, Vol.7, No.4, p.p. 53-66.

[16]. Srichai, Ch. And Thommakoranonta, N (2011). Dimensions influencing business intelligence usage in Thailand SMEs. International Confrence on Management and Artificial intelligence, Vol,6.

[17]. Sternad, S., Gradisar, M., & Bobek, S. (2011). The influence of external factors on routine ERP usage. Industrial Management & Data Systems, 111(9), 1511–1530.

[18]. Scott, J. E., & Walczak, S. (2009). Cognitive engagement with a multimedia ERP training tool: Assessing computer self-efficacy and technology acceptance. Information & Management, 46(4), 221–232.

[19]. Saddle, S. (2009). The weighted risk analysis. Safety Science, No.47, p.p.668-679.

[20]. Schaper, L.K. and Pervan, G.P. (2007). ICT and OTs: a model of information and communication technology acceptance and utilization by occupational therapists. International Journal of Medical Informatics, 76(supplement 1) s212-s221.

[21]. Tsui, A. S., Zhang, Z., Wang, H., Xin, K.R. and Wu J.B (2006). Unpacking the relationship between CEO leadership behavior and organizational culture, The Leadership Quarterly, 17, 113-117.

[22]. Yeoh, W. and Koronios, A. (2011). Critical success factors for business intelligence systems. Journal of Computer Information Systems.

[23]. Youngberg, E., Olsen, D., & Hauser, K. (2009). Determinants of professionally autonomous end user acceptance in an enterprise resource planning system environment. International journal of information management, 29(2), 138–144.

[24]. Venkatesh, V. Morris, M. Davis, G. and Davis, F. (2003). User acceptance of information technology: Toward unified view. MIS Quarterly, Vol.27, No.3, p.p. 425-478.

[25]. Zhang, S., Zhao, J. & Tan, W. (2008). Extending TAM for Online Learning Systems: An Intrinsic Motivation Perspective. Tsinghua Science and Technology 13(3), 312-317.